**International Day against Drug Abuse and Illicit Trafficking—26 June**

**United Nations Decade against Drug Abuse 1991–2000**

# DETECTING DRUG CROPS FROM SPACE

Illicit narcotic drug production, trafficking and abuse continue to threaten political institutions and economies, especially as a result of escalating drug-related violence. Law-enforcement officers, journalists, judges and politicians—including a presidential candidate in Colombia—have been slain by narcotraffickers in a campaign of terror that has placed democratic institutions in Colombia and Peru virtually under siege.

This assessment comes from the 1990 annual report of the International Narcotics Control Board.

Traffickers are not only well financed and heavily armed, the report says, but have become more innovative and better organized. During 1990, trafficking organizations in South America and Western Europe may have been using each others' routes in a joint venture to smuggle cocaine to Europe and heroin to North America. The current abundant supply of heroin makes this development particularly ominous, says the report.

## SATELLITE DETECTION

To counter the drug threat, the Division of Narcotic Drugs of the United Nations International Drug Control Programme is promoting a range of new technologies. One of them is the use of satellites to detect illicit drug cultivation.

To foster the use of this technology, the Vienna-based Division convened a Meeting of Experts on the Detection of Illicit Cultivation of Narcotic Plants by Remote Sensing, held in Vienna in October 1989. The meeting was attended by specialists selected on the basis of their experience and expertise relating to the application of remote-sensing techniques.

The experts stressed the value of detection of drug crops by remote sensing, which can provide information on the location and extent of cultivation, and serve as a barometer to gauge the extent of eradication over time.

Ongoing projects illustrate the importance of this technique. In a pilot project in India, visual interpretation and digital analysis of satellite images taken at the right time in the crop cycle has made it possible to identify illicit poppy fields in remote areas.

In Brazil, remote sensing has been successfully used in two main regions of drug crop cultivation. These are the semi-arid north-east, where cannabis was found, and Western Amazonia, an area of tropical rain forests, where coca bush plantations have been located along the border with Colombia, Peru and Bolivia. In Amazonia, illicit coca cultivation was identified through the detection of the topographical changes it caused, such as the presence of airstrips and other activities related to its cultivation.

In Thailand, poppy growers tend to congregate, making their detection by remote sensing possible in spite of the small size of the individual plots.

Today three countries have remote sensing capabilities to acquire satellite imagery for the identification of narcotic crop cultivation. These are France using the Spot system, the Soviet Union by means of the Kosmos platform, and the United States through Landsat TM. Japan and the European Space Agency in 1991, and Canada in 1994, plan to launch platforms that will permit the collection of high-resolution images.

Airborne synthetic aperture radar (SAR)—a kind of radar photography—can be applied to identify crops and monitor vegetation. This technology has several advantages, including that of penetrating cloud cover, the experts said. SAR imagery will be routinely available with the launching of satellites by the European Space Agency, Japan and Canada in 1991 and 1994.

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## ENVIRONMENTAL HAVOC

Using aerial photographs, several experts showed the vast environmental damage caused by drug plant cultivation. The slash-and-burn clearing technique, commonly used to prepare new ground for drug crops, is becoming a major cause of deforestation, soil erosion and changes in river flows.

Cultivation of coca in Peru and Bolivia and of cannabis in Jamaica is causing extensive environmental damage. About 80 per cent of the deforestation in Peru's Huallaga region is associated with cultivation of the coca plant. Coca growers are often migrants from the city, rather than local farmers. They are attracted to drug cultivation by the possibility of high and quick profits.

Deforestation and soil erosion are becoming acute problems, especially in areas where drugs are grown on steep slopes in difficult mountain terrain to evade detection.

Even after successful crop eradication programmes, it is difficult to carry out reforestation or crop substitution, owing to depleted soil nutrients and the intensive use of herbicides associated with illicit drug cultivation.

The unconsidered use and dumping of chemicals and other substances used to produce drugs causes devastating pollution. In particular, the extensive use of sulphuric acid, paraffin and other chemicals to prepare coca paste pollutes water systems. In Amazonia, this has resulted in damaging and sometimes irreversible effects on aquatic life in the Amazon estuary.

## DRAWING UP A PROJECT

The experts felt that the entire world scientific community involved in remote sensing should be mobilized under the auspices of the Division of Narcotic Drugs within a project designed to improve knowledge of drug crops.

Should sufficient financial resources be made available, the project proposes to give priority to the identification of coca bush and poppy cultivation which, unlike cannabis, are restricted to specific regions, given their need for particular environments (i.e. climate, soil, altitude and the like). Countries where these plants are cultivated have been identified with a view to selecting test sites.

All data systems should be used in a complementary manner, the experts stressed. For eradication purposes, detection and analysis should be carried out as swiftly as possible.

Monitoring drug crops by remote sensing requires the use of geographic information systems integrating data from other sources. Such systems should include data on climate (temperature, rain), topography (altitude, slope) and cartography (roads, tracks, dwellings and waterways). They should also include a calendar of the different crops grown in the area with their spectral characteristics, and signs of deforestation and environmental degradation.

The project should make it possible to evaluate the different ways the data are treated. It should also provide information on the properties of drug crops and adjacent crops in such a way as to set up a data bank on their different characteristics.

In the first phase of the project, remote sensing should be accompanied by inspection on the ground at selected sites, to verify the accuracy of information interpreted from satellite imagery.

## GETTING OPERATIONAL

The United Nations Commission on Narcotic Drugs endorsed the recommendations of the group of experts in February 1990. The United Nations General Assembly, at its special session on drugs that month, suggested using satellite imagery and aerial photography for drug crop surveying and monitoring, with the agreement of the Government concerned.

Following these endorsements, the Division of Narcotic Drugs has invited donor Governments to submit project proposals, to be drafted in cooperation with countries where illicit narcotic crop cultivation takes place. The European Community, France, Germany, the Soviet Union and the United States have expressed interest in the project. Both

the European Space Agency and the Soviet Union have offered to provide data-sets free of charge.

The Division of Narcotic Drugs has defined the parameters to be used for data processing and the methodology for evaluating the results.

Operational systems to monitor illicit cultivation are being proposed for selected countries in South-East and Central Asia and Latin America, subject to their approval and cooperation.

The project is estimated to take 36 months to implement. The data are to be collected by the KA 1000, Spot, Landsat and Air Radar satellites. The test sites will cover an area of about 2,500 square kilometres.

Technical responsibility for the project could be assumed by the Remote Sensing Centre of the Food and Agriculture Organization of the United Nations, assisted by experts appointed by the Division of Narcotic Drugs.

In addition, several countries have the capability to analyse the data. Among them are Canada, France, Germany, Japan, the Soviet Union, Sweden, the United Kingdom and the United States.

The total cost of data collection per site was estimated in 1989 to be $116,000, while the total cost of the project for five sites has been estimated at $890,000. The project will provide a methodology that could be extended to countries throughout the world.

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